

REMARKS

The Final Office Action issued June 13, 2002 has been reviewed and the comments of the U.S. Patent and Trademark Office have been considered. Claim 20 has been canceled. Claims 1 and 3 have been amended. Claims 10-19 have been allowed. Claims 21-23 are withdrawn from consideration pursuant to an election requirement. Accordingly, Applicants request reconsideration of the pending claims 1-5, 21, 22 and 23.

Applicants acknowledge that claim 1 has been granted the benefits of priority application S.N. 08/795,672, and that claims 3-5 and 10-19 have not been granted the benefits of the earlier filing date of the priority application S.N. 08/795,672.

Applicants respectfully request withdrawal of the Finality of the Office Action for the following reasons: (1) 37 C.F.R. §1.142(a) states that a restriction requirement may be made at any time before final action—not concurrent with a final action as is the case in this Final Office Action; and (2) Applicants are not afforded an opportunity to address the restriction requirement when prosecution is closed, thereby contravening the stated policy in MPEP §706.07 of “dealing justly with the applicant and the public” in bringing about a speedy conclusion of the prosecution of this application.

Claims 1-5, 10-19, and 21-23 have been restricted pursuant to a telephone restriction requirement made on June 7, 2002. Applicants affirm the provisional election of claims 1-5 and 10-19 but traverse the restriction requirement because: (1) the Office Action fails to satisfy the burden to “*provide reasonable examples that recite materials differences*” as noted in MPEP § 806.05(e), and (2) a search of claims 21-23 is not a serious burden. First, the Office Action states that the apparatus as claimed can be used to practice another and materially different process that does not require the claimed feature of the cross-sectional area of a body passage less than 2.25 times the generally uniform cross-sectional area of a needle. However, the record fails to indicate a reasonable example of such a process, as required in MPEP § 806.05(e). Second, an examination of claims 21-23 on the merits does not represent a serious burden as noted in MPEP § 803 because: (a) all pending claims are classified within a single class—class 239, (b) claims 21-23 have been restricted by the Office to class 239, subclass 5, which is believed to contain less than 100 U.S. Patents, and (c) more importantly, claims 20-23 have already been searched and examined on at least three prior occasions (i.e. the first Office Action issued October 02,

2000, Final Office Action issued May 09, 2001, and in response to a Request for Continued Examination of October 05, 2001). And as stated in MPEP § 803, if the search and examination can be made without serious burden, as it has been demonstrated here, the entire application “[m]ust be examined on the merits, even though it includes claims to independent or distinct inventions.” Accordingly, Applicants respectfully request withdrawal of the restriction requirement, rejoinder and examination of claims 21-23.

The drawings have been objected to as failing to recite claimed features of claim 10. Applicants propose to provide new Figures 4A and 4B in a separate paper entitled “Request for Approval of Proposed Drawings” so as to comport with the specification and claims. Support for the new Figures is provided in the originally filed specification at , for example, page 6, lines 25-29, and also based upon Figures 3 and 4 of parent application S.N. 08/795,672, which has been incorporated by reference in its entirety in this application.

The specification has been objected to for allegedly failing to provide antecedent basis for a guide member and a flat disk in claims 1 and 3. Applicants respectfully note that a guide member can include a guide disk. In order to advance prosecution, Applicants have amended claims 1 and 3 to recite a guide disk. Support for this amendment to claims 1 and 3 is provided in the originally filed specification at, for example, page 6, lines 19-24.

Claims 3-5 stand rejected under 35 U.S.C. §112, first paragraph, as containing subject matter not described in the specification. The ground for rejection under 35 U.S.C. §112, first paragraph, (i.e., written description) with respect to the invention as a whole as recited in claims 3-5, appears to be based on an erroneous conclusion that the originally filed specification failed to convey that the inventors had possession of the claimed invention as a whole. Specifically, the Office Action alleges that the specification is “[e]nabling for only one flat disk” instead of the claimed feature of “at least one flat disk.”

Applicants assert that the inventors, at the time of filing of this application, had possession of the claimed feature of “at least one flat disk.” Applicants submit that the originally filed specification support Applicants’ assertion. The specification states, for example, at page 6, lines 21-22, that “the swirl generator is constructed from at least one flat disk. The swirl generator, as shown in Fig. 1, includes a pair of flat disks ...” Therefore, the originally filed specification clearly supports a plurality of disks, including one or more guide disk and one or

more flat disk, and unequivocally conveys that the inventor had possession of the claimed invention. In order to advance prosecution, Applicants have amended claim 3 to recite a flat disk but reiterate that this term does not limit the scope of the claim to a single flat disk. Accordingly, this rejection should be withdrawn.

Claims 1 and 2 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Daly. Claims 3-5 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Wieczorek in view of Muller.

Insofar as the rejections are applicable to amended claims 1 and 3, Applicants respectfully traverse these rejections because neither Daly, Wieczorek, nor Muller, singularly or in combination, teaches or suggests every feature of amended claims 1 or 3.

Claim 1 recites a fuel injector that includes, *inter alia*, a metallic cylindrical annulus and a swirl generator having a generally constant cross section between an outer perimeter and a central aperture. The swirl generator includes a guide disk contiguous to a flat disk. Support for the amendment to claim 1 is provided in the originally filed specification at, for example, page 6.

In contrast, Figure 1 of Daly indicates that a body of the fuel injector is plastic by a sectional legend, readily understood by one skilled in the art, as resin or plastic (*See*, MPEP 608.02, page 600-95, 8th Ed., Aug. 2001)—instead of a metallic cylindrical annulus as recited in claim 1. Further, Daly states, at lines 34-40, and shows, in Fig. 2, a needle guide member 18 with skewed holes 34. That is, the needle guide member 18 is a single piece member—instead of a guide disk contiguous to a flat disk, as recited in claim 1. Moreover, as stated at column 3, lines 5-18, the member 18 of Daly is also configured to minimize a trapped volume of fuel by having an increase in the cross-sectional area of the member between the outer perimeter of the member and the central opening 25—instead of swirl generator having a generally constant cross-section between the outer perimeter and the central aperture.

Notwithstanding the deficiencies of Daly, the Office Action asserts that it would have been obvious to form the single piece member 18 as two pieces to ease manufacturing as a matter of routine skill in the art. Applicants respectfully assert that the claimed features of a guide disk and flat disk, respectively, are not a matter of routine skill because Applicants have discovered that the combination of a multi-piece swirler allows for tangential slots to be formed in one of the disks, as described in the originally filed specification at, for example, page 6. One

of ordinary skill would not modify the single piece member 18 of Daly into a multi-piece member with a constant cross-section because such modification could increase—instead of minimizing—a trapped volume of fuel in Daly, and could render Daly unsatisfactory for its intended purpose. Furthermore, Daly relies on a plastic bodied fuel injector that, when modified as proposed by the Office Action for direct injection application, could render Daly unsuitable for its intended purpose due to the high heat and pressure of direct injection. And as noted at MPEP §2143.01, “[i]f the proposed modification would render the prior art invention unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” Accordingly, claim 1 is patentable over Daly.

The Office Action relies upon the legal basis of routine optimization in combination with Daly to render obvious the fuel injector of claim 2. In particular, the Office Action asserts that it would have been a matter of routine optimization for one of ordinary skill in the art to arrive at the claimed relationship between body passage and the needle. However, one of ordinary skill in the art would not modify Daly as a matter of routine optimization because Daly is unconcerned with the problem of temperature stabilization in a direct fuel injection application. This is evidenced by the plastic body and elastomeric seal, as shown in Fig. 1 of Daly, which is believed to be inapplicable for direct injection application. Applicants, in contradistinction, have discovered a specific relationship of the recited features that allows temperature stabilization of a high pressure, direct injection fuel injector, as recited in claim 2. The only motivation to modify Daly so as to reach the claimed invention as a whole is supplied by Applicants’ own disclosure, which has been improperly relied upon. Accordingly, claim 2 is patentable over Daly.

Claim 3 recites a direct injection fuel injector that includes, *inter alia*, a cylindrical annulus and a swirl generator contiguous to a first surface that intersects an oblique surface of the seat, which surface is adapted to engage a needle in an unactuated position. Support for the amendment to claim 3 is provided in the originally filed specification at, for example, page 6, and Figs 2A and 2B.

In contrast, Wieczorek states, at column 2, lines 3-10, that a needle guide member 26 is affixed to a rim (unlabeled) of a seat member 14 disposed substantially upstream of the seat 20 and its transverse seating surface 22. The rim surface of Wieczorek (on which the guide member 26 is disposed) intersects a conical wall surface 16 of well 34 and does not intersect the conically

tapered portion 24a of the seat 20. In other words, the guide member 26 of Wieczorek is located far away from the seat 20 and its conically tapered portion 24a so that a particle trap formed by well 34 could be employed with this particular configuration of the seat and guide.

Despite the deficiencies in Wieczorek, the Office Action asserts that it would have been obvious to one of ordinary skill to replace a guide member 26 of Wieczorek with a guide element 35 and a swirl element 47 (i.e. swirler) of Muller so as to increase divergence of fuel. However, the proposed combination of Wieczorek with the teachings of Muller fails to cure the deficiencies identified above in Wieczorek because one of ordinary skill in the art would not substitute structures from a direct injection fuel injector of Muller for a fuel injector that is non-direct injection (as evidenced by a plastic or resin body believed to be shown in Fig. 1 of Wieczorek) because the operational configurations (e.g., fuel pressure, temperature and types of fuel) of direct and non-direct injection are different. And Muller does not suggest modifying Wieczorek without the benefit of Applicants' disclosure.

In particular, Muller states, at column 5, lines 35-49, that a swirl element 47 is disposed on a flat surface (unlabeled) and surrounds a valve closing segment 28 of a valve needle 20 and tapered seat surface 27 so that fuel is imparted with a momentum while flowing through the swirl chamber and through a discharge opening 32. That is, the swirler is configured in Muller so that fuel can be swirled generally within the conical tapered sealing surface of the seat 26 and out of the fuel injector through the discharge opening 32. Hence, on one hand, a direct substitution of the swirler of Muller for the guide of Wieczorek could fail to permit a tangential swirling motion of the fuel within the sealing surface of the conical seat, and on the other hand, a modification of the guide and seat of Wieczorek as taught by Muller would require a substantial reconstruction of the seat of Wieczorek that could obstruct the particle trap formed by well 34 of Wieczorek, thereby changing one of the principle operations of the particular seat configuration of Wieczorek (col.1:39-41). Thus, a direct substitution between the relied-upon references could fail to provide a tangential swirl to be generated within the conical tapered seat of Wieczorek, while a modification of Wieczorek based on the teachings of Muller could change the principle operation of Wieczorek. And as noted in MPEP §2143.02, “[i]f the proposed modification or combination of prior art would change the principle operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie*

obvious.” Accordingly, claim 3 is patentable over Wieczorek or Muller, singularly or in combination thereof.

Claims 2-5 and 22-23 depend ultimately from respective independent claims 1, 3 and 21, are therefore also allowable for at least the same reason as claims 1, 3 and 21, as well for reciting additional features.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully request entry and consideration of the application because the amendment places the application in condition for allowance or in better form for appeal. Moreover, no new issues have been raised, no new matter has been entered, and no additional claims have been added by this Amendment.

Applicant respectfully invites the Examiner to contact the undersigned at (202) 739-5203 if there are any outstanding issues that can be resolved via a telephone conference.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached pages are captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE.**"

EXCEPT for issue fees payable under 37 C.F.R. §1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0310. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. §1.136(a)(3).

Respectfully submitted,

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VERSION WITH MARKINGS SHOWING CHANGES MADE**IN THE SPECIFICATION:**

The paragraph on page 6, starting on line 25 has amended as follows:

--The guide disk 86, as shown in Figs. ~~2A and 2B~~, 2A, 2B and 4B, has a perimeter 90, a central aperture 92, and a plurality of fuel passage openings 94 between the perimeter 90 and the central aperture 92. The swirl disk 88, as shown in Figs. 2A, 2B and 4A, has a plurality of slots 100 that corresponds to the plurality of fuel passage openings 94 in the guide disk 86. Each of the slots 100 extends tangentially from the respective fuel passage openings 94 to the central aperture 92.--

IN THE CLAIMS:

Claims 1 and 3 have been amended as follows:

1. (Thrice Amended) A direct injection fuel injector having a fuel inlet, a fuel outlet, and a fuel passageway extending from the fuel inlet to the fuel outlet along a longitudinal axis, the fuel injector comprising:

a body having an inlet portion, an outlet portion, a neck portion disposed between the inlet portion and the outlet portion, the neck portion including a metallic cylindrical annulus that provides a body passage extending from the inlet portion to the outlet portion along the longitudinal axis of the fuel injector;

an armature proximate the inlet portion of the body;

a cylindrical needle operatively connected to the armature;

a seat disposed at the outlet portion of the body; and

a swirl generator proximate the seat and having a generally constant cross-section between an outer perimeter and a central aperture, the swirl generator having a guide ~~member~~disk contiguous to a flat disk;

VERSION WITH MARKINGS SHOWING CHANGES MADE

wherein the cylindrical annulus of the body includes an inner diameter that is greater than a diameter of the cylindrical needle so as to define the body passage, which maintains an operative relationship between the body and the needle when the body is exposed to operating temperatures of a cylinder of an engine.

3. (Thrice Amended) A direct injection fuel injector having a fuel inlet, a fuel outlet, and a fuel passageway extending from the fuel inlet to the fuel outlet along a longitudinal axis, the fuel injector comprising:

a body having an inlet portion, an outlet portion, a neck portion disposed between the inlet portion and the outlet portion, the neck portion including a cylindrical annulus that provides a body passage extending from the inlet portion to the outlet portion along the longitudinal axis of the fuel injector;

an armature proximate the inlet portion of the body;

a cylindrical needle operatively connected to the armature;

a seat disposed at the outlet portion of the body, the seat having a first surface intersecting a second surface, the first surface generally perpendicular to the longitudinal axis and the second surface generally oblique to the seat and adapted to engage the needle in an unactuated position of the needle; and

a swirl generator ~~proximate~~ contiguous to the first surface of the seat, the swirl generator having a guide ~~member~~ disk contiguous to ~~at least one~~ flat disk;

wherein the cylindrical annulus of the body includes an inner diameter that is greater than a diameter of the cylindrical needle so as to define the body passage, which maintains an operative relationship between the body and the needle when the body is exposed to operating temperatures of a cylinder of an engine, and wherein the seat includes a first surface exposed to the fuel passageway and a second surface exposed to an exterior of the fuel injector, the first surface being spaced from the second surface a defined distance along the longitudinal axis, the first surface having at least one cut-out configuration that extends for a fraction of the defined distance into an interior of seat.
